Transitioning to Water Sensitive Cities: A summary of the key findings, issues and actions arising from five national capacity building and leadership workshops

Other

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Citation: Ison, R.L., Collins, K.B., Bos, J.J. & Iaquinto, B. (2009) Transitioning to Water Sensitive Cities in Australia: A summary of the key findings, issues and actions arising from five national capacity building and leadership workshops. NUWGP/IWC, Monash University, Clayton.

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Acknowledgements

The International WaterCEntre and Monash University would like to acknowledge the support of Dow Chemical Company.

Executive Summary

Introduction to the report and workshops

This report summarises the key findings, issues and actions arising from five national capacity building and leadership workshops on Transitioning to Water Sensitive Cities in Australia

The five workshops, each of two days, were held in each of the state capitals during February 2009. A further workshop was held in Canberra in May 2009 to report on the findings of the state capital workshops and to facilitate a faster take-up of water sensitive cities projects and initiatives

The workshops were initiated by a partnership between the International WaterCentre (IWC) and the National Urban Water Governance Program (NUWGP) and Monash University, with key sponsorship from the Dow Chemical Company.

Aims & Objectives

The objectives of the national workshop series were to:

- disseminate leading edge findings from a range of research programs
- enhance the capacity of water practitioners and their organisations to transition towards a more sustainable 'water sensitive city'
- develop a shared understanding of what a 'water sensitive city' might look like and the associated barriers and opportunities for achieving this outcome.

The workshops were designed and conducted as a learning process based on presentations and interactive discussion in each workshop. The aim was to:

1. acknowledge and value the experience of those present
2. share views, knowledge and experience of the current situation relating to urban water management in general and the host city or region in particular and
3. identify key issues, opportunities, characteristics and actions for creating Water Sensitive Australian Cities.

Design of workshops

The interactive sessions were organised as table-based 'systemic inquiries' into transitioning to water sensitive cities. This was based on the assumption that 'creating water sensitive cities' was a 'wicked problem' situation, that a diversity of views and perspectives needed to be engaged and that the presentations and interactive sessions would be mutually supportive. The design was thus an alternative to the common linear (transfer of technology) model for doing research and development.

Participants

A total of 529 participants (including host team of presenters) participated: Perth – 70 participants; Brisbane – 106 participants; Melbourne – 162 participants; Sydney – 119 participants and Adelaide – 72 participants. In all there were 470 participants in the national workshops with a further 65 participating in the Canberra workshop.

Material arising from these workshops was used to design and conduct a follow-up event in Canberra for national policy-makers (Friday 22nd May).[1]

Participants came from a wide range of professional, disciplinary and organisational backgrounds. The majority worked in policy/strategy or design/technical design/operations with engineering or science backgrounds, but planners, social scientists, economists, landscape designers, urban horticulturalists, lawyers and natural resource managers were also represented. Participants came from across all domains of urban water management in Australia, and experience of working in the sector ranged from one to over 20 years, with a corresponding spread of management seniority.

The motivations of those attending were predominantly concerned with personal learning and continuing professional development (CPD). It was also clear that many were driven by a desire to engage in discussion and networking and also promote change. This suggests an appreciation of the importance of the topic and its relevance to the professional lives of participants.

A follow up evaluation survey was conducted to assess participants' views on substantive issues and design of the workshop. A total of 178 responses were received, representing a healthy 34% response rate. The evaluation respondents were generally representative of the total population of participants.

Outputs

The workshops (including the evaluation survey) generated a substantial body and range of data which have been the subject of on-going analysis and interpretation. The results discussed in this report should be considered as a high-level overview. More detailed assessments will be reported in peer review publications.

The key outputs of the workshops were:

- **issues and opportunities** that enable or constrain transitioning to water sensitive cities
- **characteristics of water sensitive cities**[2] from participants' perspective
- participants' recommendations for **priority actions** in each city (what, why and by whom)
- participants' own **personal enthusiasms** for action
- **group-based systems maps** of the interconnected set of activities needed to effect transitioning to water sensitive cities derived from their two day systemic inquiry[3]

All of the raw data has been posted on the IWC website and made accessible to the workshop participants according to their original registration.[4] The same has been done for the Canberra workshop.

Findings

The main findings of the workshops and evaluation survey are presented in four sections:

- Key findings - transitioning to water sensitive cities;
- Workshop design and implementation;
- Impact and understandings;
- Recommendations for follow-up action.

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1 This report does not concern itself with the design and/or outcomes of the Canberra workshop.

2 Except for Perth – this activity was only introduced in the second workshop.

3 Due to our own learning in the workshop series, systems maps were only developed for the later workshops in Sydney, Melbourne and Adelaide.

4 At the time of writing this does not include the data from the follow-up evaluation but much of the detail from this evaluation is presented here as Annex 2.

Transitioning to water sensitive cities - Issues

Although expressed in different ways, the main issues can be summarised under the following themes:

- Vision, goals and common understanding
- Social and institutional perceptions, change and attitudes
- Institutional capacity and governance
- Funding, (true) cost, value.

A significant majority of issues identified were perceived to be institutional, economic and political. There were differences between cities, e.g. Adelaide respondents rated institutional capacity as more of an issue than did other cities, but felt that leadership and political will was less important than did participants in other cities, e.g. Melbourne.

Transitioning to water sensitive cities - Opportunities

The main opportunities identified in the workshops to transition to a WSC relate to the following themes:

- (De)centralised and green technology and infrastructure, water (re)sources and diversity of use
- Knowledge, data, information and research and learning
- Regulation, policy and planning
- Social concerns, awareness, support and stakeholding
- Climate change, drought and (financial) crisis.

The nature of opportunities identified did not differ greatly between cities at the generic level of this analysis. The detailed data analysis currently being undertaken will however provide more detailed assessment of city-based differences. For example, and perhaps not surprisingly, given the experiences of Salisbury Council, Adelaide participants rated very highly the opportunities for decentralised and green technology.

Transitioning to water sensitive cities - Characteristics

The characteristics of the WSC identified in the workshops are divided into three high level main themes:

- Cities as supply catchments – a diversity of sources, use and delivery options; resilience and adaptivity of the city, and water managing as part of a holistic and integrated system.
- Cities providing ecosystem services - green infrastructure, space and other visual and physical aspects of a WSC, ambiance and atmosphere of the city, and waterways (including quality).
- Sophisticated and water smart cities - community acceptance and engagement, collaboration, coordination and a range of institutional aspects, and the incorporation of true cost in decision-making.

Whilst technology has been identified as an important characteristic of a WSC the data reveals a clear need for decentralised options and green technology. However, technology per se was not seen as an obstacle to creating a WSC. More emphasis was placed on the importance of institutional and social aspects rather than the individual technology to make the transition happen.

There were relatively few differences between the cities in the characteristics identified.

Transitioning to water sensitive cities – Priority Actions

The priority actions identified by participants from each city can be grouped into four main themes:

- Creating a supportive institutional-sectoral environment in which there is a culture, commitment and support for the WSC as demonstrated by funding, incentives and a collaborative and coordinated institutional approach.
- Providing direction, vision and leadership for the WSC, such as clarifying and creating common understanding of what the WSC is and how we can get there in terms of regulation, policy and planning.
- Implementing a WSC by progressing on-ground ‘true-cost’ alternative solutions, tools and methodologies and using demonstration projects within a continual learning-by-doing cycle.

- Sharing knowledge and raising awareness and skill among the sector and the wider community by establishing interdisciplinary and multi-sectoral approaches between stakeholders.
- Developing a collaborative and coordinated approach among all cities by improving communication and coordination within and between organisations and also to promote a multi-disciplinary approach.
- Establishing a national network or forum for WSC.

Transitioning to water sensitive cities – Personal Actions

Key areas for action at a person level in helping to create water sensitive cities that were identified by the participants include:

- Progress innovation and demonstration project.
- Share knowledge and information in order to raise awareness.
- Facilitate a more collaborative approach within their current practices in order to break down organisational and institutional silos.
- Contribute to city visions for WSC.
- Purposefully influence, advocate and challenge existing practices, norms and attitudes in all cities.

Transitioning to water sensitive cities – Constraining and Enabling Factors

Significant constraints in moving towards water sensitive cities included lack of resources (broadly defined), lack of commitment, will and support, lack of ability to influence decisions and policy and current mindsets and attitudes. The individual pattern of constraints varies from context to context and will be experienced in different ways by different actors in the situation.

Many of the constraints, with suitable shifts, also hold the key for enabling action. Organisational and local political support coupled with high level sector support and dedicated funds alongside availability of knowledge and research are key to enabling action. These findings point towards the significance of social processes to enable deployment of technologies for creating water sensitive cities.

Transitioning to water sensitive cities – Recommended Action for Governments

Federal government, participants suggest, should co-develop a national vision for WSC that is facilitative and prioritises policies and incentives that are designed to be locally adaptable. They should enable integration, particularly across states, implementing legislation, and enabling funding at a systemic level. A national forum on Water Sensitive Cities should be urgently developed.

According to participants, the state government should take a leadership role in visioning WSC at state level. It should align policies and integrate planning. It should commission large demonstration projects and invest in intellectual capital. In addition it has a role to play in awareness campaigns around being water sensitive.

Local government should link and integrate policy, planning and implementation, it should cooperate with other stakeholders, encourage trial developments, engage and educate the community and reinforce a new way of working. Local government councillors and senior staff should show commitment and support efforts initiated at lower levels.

There is a perceived lack of synergy between the three tiers of government and a perception that many of the actions identified at local and state government were of the same nature.

Transitioning to water sensitive cities – Messages to Canberra

The key messages which participants wished to convey to the Canberra workshop are as follows:

1. Recognise the need for urgent action to transition to water sensitive cities in Australia.
2. Create a strong and supportive policy and regulative environment.
3. Enable and provide dedicated funding for transitioning.
4. Facilitate an integrated and coordinated approach with an emphasis on intergovernmental synergy (at all levels).

5. Develop practical suggestions which are sensitive and adaptive to local context.
6. Ensure communities are part of the debates and implementation process.
7. Provide a sense of leadership and vision on transitioning to WSC.

Much of the emphasis for action arises from a keen sense of the water shortages being experienced in the context of debates about climate change, alongside the particular mix of drivers which varies from state to state. The agreement on the need for action is emerging from an interdisciplinary, cross-sectoral and multi-city perspective. Creating Australian WSCs is seen as ensuring a sustainable future for Australia in terms of economy, environment and community.

Workshop design and implementation

Based on feedback from the workshop evaluation, the workshops enabled multiple perspectives of the participants to contribute to understanding the issues and precluded narrowly held views from dominating. Interest in using the workshop techniques in their own situations was significant.

The evaluation survey reveals that personal expectations of the Water Sensitive Cities workshop were met in terms of design, content and interaction. The motivation for the NUWG/IWC partnership to organise and run these events was justified in that 53% of respondents reported that their perceptions of a water sensitive city changed and 74.6% reported an increased understanding of the characteristics of a water sensitive city.

Impact and changed understandings and practices

At a generic level, over half the respondents reported that their perceptions of a water sensitive city had changed as a result of participation in the workshops and three-quarters reported an increased understanding of the characteristics of a water sensitive city. The workshops brought about substantial changes in conception about the opportunities for progressing water sensitive cities. Attendees reported being more aware of stakeholder dependencies and having strengthened and/or made new contacts in the water sector. In Adelaide a new network was initiated as an outcome of the workshop.

The evaluation evidence demonstrates a substantial shift in the 'community of conversation'[5] about water sensitive cities at interpersonal, inter- and intra-departmental and inter-organisational levels. The evaluation showed evidence of increased advocacy about creating WSC and changes in policy at departmental levels. As noted earlier, many participants were also planning to utilise some of the participative techniques used in the workshops in their own organisations.

Some of the key shifts in understanding and practices are characterised by:

i. a substantial development in the conversations about water sensitive cities at interpersonal, inter- and intra-departmental and inter-organisational levels;
ii. changes in conception about water sensitive cities ;
iii. embryonic changes in policies at, mainly, departmental levels;
iv. increased advocacy for water sensitive cities at all levels.

Recommendations for follow-up action

Although time scale estimates differ, there is a clear sense in which participants feel it is feasible to create water sensitive cities in Australia in the next 5-20 years. Participants favoured a range of follow-up actions to the workshops, but especially sharing information and networking with emphasis on practical 'how to' demonstrations.

5 This could also be understood as the building of a discourse – see Krippendorff (1995) Redesigning Design; An Invitation to a Responsible Future. Pages 138-162 in Päivi Tahkokallio & Susann Vihma (Eds.) Design - Pleasure or Responsibility? Helsinki: University of Art and Design, 1995.

Key Messages

Based on our own analysis to date, the key messages arising out of the workshop series are as follows:

i. Realising the urgency
ii. Leading, facilitating and sustaining a vision for Australia's cities
iii. Designing in sustainability and focussing on the long-term;
iv. Tackling issues holistically – enabling integration;
v. Rethinking institutional arrangements
vi. Building community and industry support and
vii. Recognising situational and contextual nature of innovation and change.

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Acknowledgements

The report authors are grateful to the confidence placed in them by staff of the NUWG Program at Monash and the IWC, particularly A/Prof Rebekah Brown and Mark Pascoe

The participants deserve the majority of the credit however for their contributions during the workshops. The results belong to the urban water sector as a whole, particularly those motivated to do what is best in changing and uncertain times. For this reason all the raw data from the workshops has been placed on a purpose-designed website accessible to participants from each city (see www.watersensitivefutures.org).

We thank the many sponsors who made these events possible, particularly the Dow Chemical Company and the National Water Commission.

Effective workshops require excellent planning and logistics. In this regard we were helped immensely by Fiona Chandler (IWC) and Stacey Sawchuk (NUWGP). First class audio visual support for the events was provided by Andrew and Wendy Flanagan.

We also note the significant contribution made by Rebekah Brown in helping to organise and analyse the workshop data.

1. Overview of workshop aims, design and attendance

In partnership with the National Urban Water Governance Program (NUWGP), Monash University, and with sponsorship from the Dow Chemical Company, the International WaterCentre convened a series of workshops in each of the state capitals to explore opportunities for creating Water Sensitive Cities (WSC) in Australia.

The objectives of the national workshop series were to:

- disseminate leading edge findings from a range of research programs being conducted by Monash University's National Urban Water Governance Program (NUWGP), Facility for Advancing Water Biofiltration, and Sustainability Institute;
- enhance the capacity of water practitioners and their organisations to transition towards a more sustainable 'water sensitive city' through facilitated 'inquiry' sessions and conversations; and
- develop a shared understanding of what a 'water sensitive city' might look like and the associated barriers and opportunities for achieving this outcome.

The series of events across Australia was conceptualised and conducted as a learning process based on presentations and interactive discussion in each workshop. The design included a mix of presentations of the latest national and international social and technological research and interactive discussions.

The interactive nature of the workshop was designed to:

i. acknowledge and value the experience of those present;
ii. share views, knowledge and experience of the current situation relating to urban water management in general and the host city or region in particular; and
iii. identify key issues, opportunities, characteristics and actions for creating Water Sensitive Australian Cities.

To meet the objectives and learning aspirations for participants, a generic 'learning system' was developed which was adapted to the specific contexts encountered in each city. The theoretical and praxis (theory informed practice) basis for the design of the learning system is described more fully in Annex 1. In summary, the workshop designers accepted that the task was (i) a 'research task', (ii) conceptualised as design and praxis research in which our primary concern was (iii) the design, implementation and evaluation of 'a learning system'. The design was thus an alternative to the common linear (transfer of technology) model for doing R&D (Russell and Ison 2007).

The learning system used in the workshops is depicted in Figure 1. A series of activities is shown which constitutes the learning system. The second activity in the learning system, after clarifying purpose (with organisers and sponsors), was to engage in conversation. This was achieved using the technique of conversation mapping, which proved to be highly popular amongst many (but not all) participants (see Annex 1 for more detail).

In Practice…

Figure 1. The 'creating water sensitive cities learning system' design (centre) with illustration from the Adelaide workshop of some of the key processes.

A total of 529 participants (including host team of presenters) participated: Perth – 70 participants; Brisbane – 106 participants; Melbourne – 162 participants; Sydney – 119 participants and Adelaide – 72 participants. In all there were 470 unique participants in the national workshops with a further 65 participating in the Canberra workshop. Material arising from these workshops was used to design and conduct a follow-up event in Canberra for National policy-makers (Friday 22nd May).6

Participants came from a wide range of professional, disciplinary and organisational backgrounds. Almost 75% worked in policy/strategy or design/technical design/operations. The main disciplinary backgrounds were engineering or science (62%) but included planners, social scientists, economists, landscape designers, urban horticulturalists, lawyers, natural resource managers and others. A significant number of participants had additional qualifications in a second academic/professional area.

6 This report does not concern itself with the design and/or outcomes of the Canberra workshop.

There was a reasonable spread of participants from across all domains of urban water management in Australia (see Figure 2). Participants had worked in the water sector from one to over 20 years. Employment sectors of participants differed between cities with more local government dominance in Sydney and Brisbane; Sydney was notable for the absence of staff from state government ministries and agencies.

Figure 2 – Sectoral representation in the workshops

Participants ranged from those who had significant managerial responsibility (20% of those completing the follow-up evaluation) to no managerial responsibility (40% of those completing the evaluation).

The motivations of those attending (see Figure 3) were predominantly concerned with personal learning and continuing professional development (CPD). It was also clear that many were driven by a desire to engage in discussion and networking and also to promote change. This suggests an appreciation of the importance of the topic and its relevance to the professional lives of participants.

Figure 3. A mindmap summarising participants' main motivating factors for attending the workshops.

A follow up evaluation survey was conducted to assess participants' views on substantive issues and design of the workshop (see Annex 2). A total of 178 responses were received, representing a healthy 33.6% response rate. On a city/state basis the response rates were: Perth (38.6%), Brisbane (23.6%), Melbourne (34.6%), Sydney (40.3%) and Adelaide (20.8%).

The evaluation respondents were generally representative of the total population of participants. The main variations were that in the evaluation Brisbane was proportionally slightly under represented and Adelaide slightly over represented; sewage and water supply professionals were slightly over represented and natural resource management (NRM) under represented. The disciplinary spread was very similar e.g. engineering 36% (survey) and 33.3% (workshop) and science 26% (survey) and 25% (workshop).

Some further details about workshop participants are given in Annex 3.

2. Overview of workshop outputs

The workshops (including the evaluation survey) generated a substantial body and range of data which have been the subject of on-going analysis and interpretation. Due to the amount of data, with post-its running into the thousands, it has been challenging to enter, analyse and interpret the data over a short time frame. As the analysis and interpretation is on-going (and three papers are being prepared for peer review publication), the results discussed in this report should be considered as a high-level overview. More detailed assessments will be reported in the peer review publications.

The key outputs were:

- **issues and opportunities** that enable or constrain transitioning to water sensitive cities
- **characteristics of water sensitive cities**[7] from participants' perspective
- participants' recommendations for **priority actions** in each city (what, why and by whom)
- participants' own **personal enthusiasms** for action
- **group-based systems maps** of the interconnected set of activities needed to effect transitioning to water sensitive cities derived from their two day systemic inquiry[8]

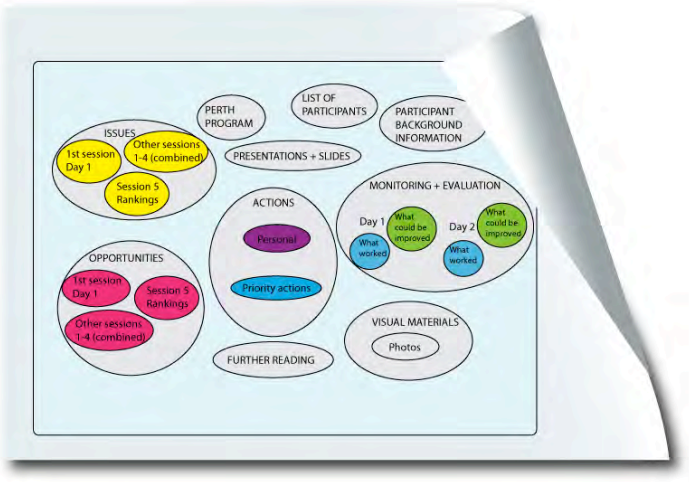

Figure 4. A copy of the entry portal to data from the workshops – Perth, Brisbane, Melbourne, Sydney, Adelaide – see www.watersensitivefutures.org

The interactive sessions were organised as table-based 'systemic inquiries' into transitioning to water sensitive cities. This was based on the assumption that 'creating water sensitive cities' was a 'wicked problem' situation, that a diversity of views and perspectives needed to be engaged and that the presentations and interactive sessions would be mutually supportive.

All of the raw data has been posted on the IWC website and made accessible to the workshop participants according to their original registration (Figure 4).[9] The same has been done for the Canberra workshop.

In the following pages, the main findings of the workshops and evaluation survey are presented in four sections:

- Key findings - transitioning to water sensitive cities;

7 Except for Perth – this activity was only introduced in the second workshop.

8 Due to our own learning in the workshop series, systems maps were only developed for the later workshops in Sydney, Melbourne and Adelaide.

9 At the time of writing this does not include the data from the follow-up evaluation but much of the detail from this evaluation is presented here as Annex 2.

- Workshop design and implementation;
- Impact and understandings;
- Recommendations for follow-up action.

3. Key findings - transitioning to water sensitive cities

This section provides an overview of the key findings related to transitioning to WSC. Firstly it describes some of the issues, then opportunities relating to transitioning to a WSC. The characteristics of a WSC identified by workshop participants are then presented followed by city specific actions and then personal actions, including constraining and/or enabling factors.

We present the data in this order because in the workshop design we started with an assumption that participants themselves had sufficient valuable experience and knowledge to begin to discuss 'transitioning to water sensitive cities in Australia'. We made no assumptions about what a WSC was – anticipating that the characteristics of a WSC would arise in the conversation as one of the major issues. In fact this did not emerge as an issue in Perth but did in Brisbane. In Brisbane and subsequent workshops the workshop design was adapted so that time was devoted to participants eliciting the characteristics of a WSC.

A key learning device or heuristic for understanding the process of transitioning (and the underlying transformations) which was prominent in the workshops and in our design and analysis is depicted in Figure 5. It shows a transition from a city which is initially focussed on securing a water supply, to one which, over time, turns attention to sewerage systems; drainage and flood prevention infrastructures and so on. Thus, whenever transitioning towards a water sensitive city is referred to it is the dynamic depicted in this figure that is of concern.[10]

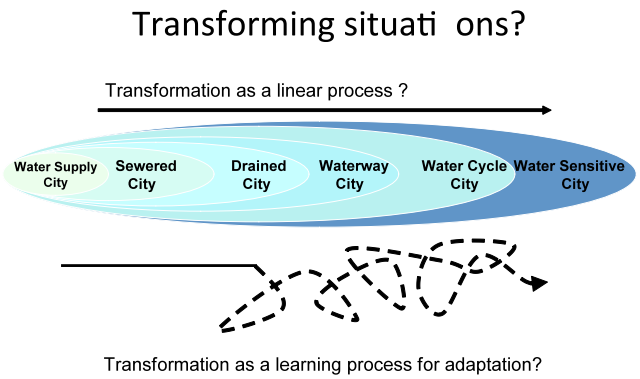

Figure 5. A heuristic model of the transition states of a water sensitive city (following Wong & Brown 2009) and the different ways of conceptualising transformation towards a water sensitive city.

10 Our own perspective is that this should not be seen as a linear process and that this figure should not be read as a linear move from left to right. Instead we suggest transitioning is an adaptive process. Transitioning is thus an expansion of possibilities of the design and nature of cities such that the WSC city encompasses all the other city-forms as sub-systems.

3.1 What was at issue in transitioning to water sensitive cities?

The issues relating to WSC were expressed in many different ways during the workshops but the main concerns can be summarised under the following themes:

- Vision, goals and common understanding (18%)
  - *"If we don't have a goal we don't get there"*
- Social and institutional perceptions, change and attitudes (14%)
  - *"Public attitudes are an issue because they drive politics"*
  - *"The risk adverse culture is an issue because it stops innovation"*
- Institutional capacity and governance (13%)
  - *"Existing institutional framework is an issue because of fragmentation and inconsistency in responsibility"*
- Funding, (true) cost, value (11%)
  - *"True cost of water (lifecycle) is an issue because it is not currently measured or brought into decision-making"*
- The following thematic issues scored between 6-8% of total issues named in terms of importance: Water source, re- use, and (integrated) water resource management; Political will, leadership and support; Climate change & population growth; and Regulation, policy and planning
- A significant majority of issues identified were perceived to be institutional, economic and political. Only 15% of the responses related to bio-physical concerns.
- Adelaide respondents rated institutional capacity as an issue more than other cities. However the lack of political will and leadership to achieve WSC was not considered as important as it was in other cities. Adelaide participants were more concerned about the role of the media as an issue than the other cities.
- A small number of Brisbane participants directly questioned the WSC concept arguing that it was not proven.
- Based on all data sources, Melbourne participants and respondents seemed to be most concerned and aware of the importance of the social aspects of transitioning to a water sensitive city. Brisbane participants did however see more focus on the social as an important opportunity. Melbourne participants gave high priority to the need for visioning and common goals, more so than the other cities.

3.2 What are the opportunities in transitioning to a water sensitive city?

The main opportunities identified in the workshops to transition to a WSC relate to the following themes:

- (De)centralised and green technology and infrastructure, water (re)sources and diversity of use (19%)
  - *"Aging infrastructure is an opportunity to replace old technology/ methods with new"*
  - *"Exploring diversity of sources as opportunity because it will contribute to resilience"*
- Knowledge, data, information and research and learning (10%)
  - *"Education to involve the community and educate decision makers"*
  - *"Informing/education is opportunity because it's needed to shape and own future directions"*
- Regulation, policy and planning (9%)
  - *"Water sensitive urban design framework is an opportunity because it sets targets"*
  - *"Legislation is an opportunity to codify a water sensitive community"*
- Social concerns, awareness, support and stakeholding (9%)
  - *"Community awareness of water value is opportunity to motivate city planners"*
  - *"More consultation to create systems that meet demand"*
- Climate change, drought and (financial) crisis (8%)
  - *"Climate change is an opportunity because impacts on water sensitivity and liveability of cities"*
  - *"Drought is an opportunity to change community behaviour and cultural change"*

The nature of opportunities identified did not differ greatly between cities at the generic level of this analysis. The detailed data analysis currently being undertaken will however provide further opportunities for stakeholders in

each city to gain fresh insights. For example, and perhaps not surprisingly, given the experiences of Salisbury Council, Adelaide participants rated very highly the opportunities for decentralised and green technology.

3.3 What are the characteristics of a water sensitive city?

The characteristics of the WSC identified in the workshops are divided into three high level main themes following the schema of Tony Wong made in his workshop presentations (see CWSC website for a copy).:

- Cities as supply catchments (25%); the main responses from the participants under this theme related to the diversity of sources, use and delivery options; resilience and adaptivity of the city, and water managing as part of a holistic and integrated system.
    - *"Flexible adaptive and diverse supply system that is reliable, resilient, robust and not vulnerable".*
    - *"A range of products spanning the potable / non-potable spectrum "*
    - *"Fully integrated systems (catchment management)"*

- Cities providing ecosystem services (37%); the main responses from the participants under this theme related to green infrastructure, space and other visual and physical aspects of a WSC, ambiance and atmosphere of the city, and waterways (including quality).
    - *"Green, pleasant urban space and places (in public and private ownership)"*
    - *"Rain gardens, wetlands, roof gardens, bio-retention systems"*
    - *"Sensitive integration of water into the landscape/ city swales"*

- Sophisticated and water smart cities (37%); the main responses from the participants under this theme related to community acceptance and engagement, collaboration, coordination and a range of institutional aspects, and the incorporation of true cost in decision-making.
    - *"Interdependence between politicians, practitioners, academics, citizens is a characteristic"*
    - *"Water is celebrated. People have a spiritual connection to water"*
    - *"Consideration of ALL costs and benefits when evaluating options"*
    - *"All government authorities working together toward common goals"*

Whilst technology has been identified as an important characteristic of a WSC the data reveals a clear need for decentralised options and green technology. However, technology per se was not seen as an obstacle to creating a WSC. Consistently throughout the data there is much more emphasis on the importance of institutional and social aspects rather than the individual technology to make the transition happen. It should be recognised though that participants did identify a need for technical capabilities and practical, applied learning, with a desire for exchange of experiences between cities and drawing on international experiences.

A characteristic of a WSC that was commonly identified was an engaged and aware community who value water and are connected to it. Such a community would accept and support different uses, sources and service provision options and have the ability to advocate for a WSC. The development and nurturing of 'social capital' is a cross cutting theme throughout the data with various suggestions as to how this could be achieved.

There were relatively few differences between the cities in the characteristics identified.

3.4 What priority actions for 'transitioning' were identified for each city?

The priority actions identified by participants from each city can be divided in four main themes which are described below:

- 42% of the identified actions were in the area of creating a supportive institutional-sectoral environment. Specific actions relate to the creation of an environment in which there is a culture, commitment and support for the WSC. According to the workshop data, this needs to be demonstrated by funding, incentives and a collaborative and coordinated institutional approach. This would entail a review and overhaul of the current governance arrangements guiding the water sector.

- 26 % of the identified actions relate to providing direction, vision and leadership for the WSC. Specific actions relate to clarifying what the WSC is and how we can get there in terms of regulation, policy and planning. It is about creating common understanding in the sector.

- 19% of the identified actions relate to the practical implementation of a WSC. Specific suggested actions relate to progressing on-ground implementation of alternative solutions and testing these in demonstration projects within a continual learning-by-doing cycle. Tools, methodologies and alternatives can be developed through this learning-practice partnership. Decision making for the on-ground works can then be based on knowledge of true cost.

- 14% of the identified actions relate to sharing knowledge and raising awareness and skills. Specific actions relate to addressing the gap in skills and knowledge for creating WSC. In order to achieve a WSC, awareness needs to be raised among the 'un-converted' and the community. In addition, suggestions identified the need for establishing sophisticated interdisciplinary and multi-sectoral approaches between stakeholders.

- There is a strong call for a collaborative and coordinated approach among all cities. This was particularly apparent in the data from the city priority actions but could be consistently found in all other data. Improved communication and coordination should take place within and between organisations within the existing framework. The need for a multi-disciplinary approach is identified and silos at different levels need to be broken down.

- Professionals from all cities would like to see a national network or forum for WSC. However, the data shows that participants from Perth and Adelaide in particular have this very high on their agenda.

- Sydney has identified a stronger need for leadership to achieve the WSC than any other city.

- Participants from Adelaide identified a higher need to investigate alternative technologies and uses of water than the other cities

3.5 What personal actions for 'transitioning' were prioritised?

Mindful that responsibility for enabling transitions is often assigned to others, the workshop design deliberately asked participants to identify key actions they wanted to take to progress transition to WSC. Key areas for action at a person level in helping to create water sensitive cities that were identified by the participants are shown in Figure 6.

Figure 6. A mindmap depicting the range of personal actions identified by workshop participants.

- Innovation and demonstration scored highest in Perth.
- Nearly 25% of the participants from Adelaide identified that they want to share knowledge and information in order to raise awareness.
- Respondents aim to facilitate a more collaborative approach within their current practices in order to break down organisational and institutional silos. All cities report wanting to facilitate collaboration and coordination.
- Perth participants want to contribute to a vision for Perth.
- Respondents will use their capabilities (and some identified power) to purposefully influence, advocate and challenge existing practices, norms and attitudes in all cities; in Melbourne however this was mentioned relatively more often.

3.5.1 Key factors that constrain personal action

While participants were keen to progress these actions, they also identified significant constraints in moving towards water sensitive cities. These are shown in Figure 7.

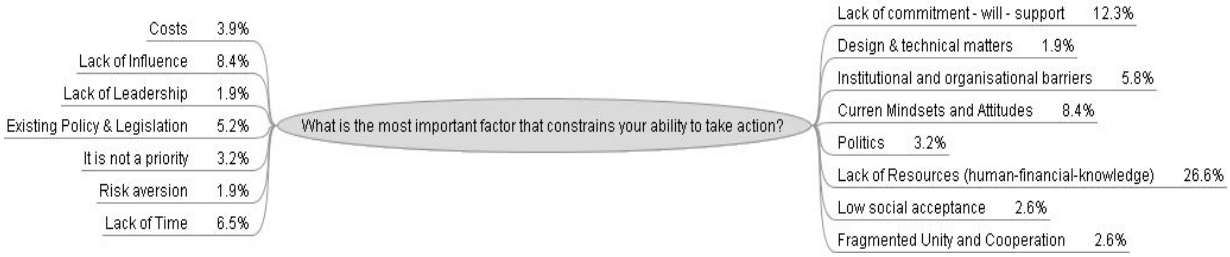

Figure 7. The key constraints to taking personal action themed and ranked.

Each of these is significant in themselves for the individuals concerned, although the individual pattern of constraints varies from context to context and will be experienced in different ways by different actors in the situation. The lack of resources represents an amalgamation of factors and is not simply referring to a lack of financial commitment.

3.5.2 Key factors that enable personal action

Based on respondents' replies, it is apparent that many of the constraints above, with suitable shifts, also hold the key for enabling action. In addition to the (reversal and/or removal) of the constraints above the participants suggest that attention should be paid to the range of factors shown in Figure 8.

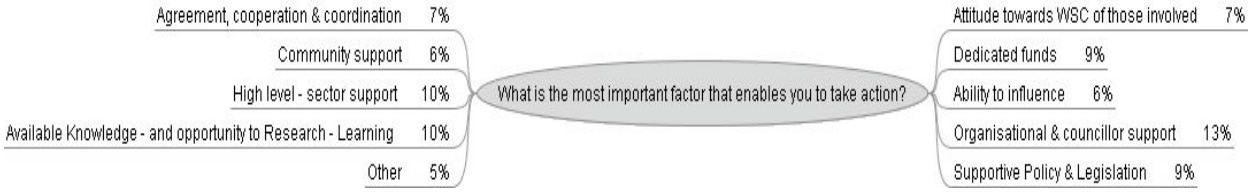

Figure 8. The key enablers to taking personal action themed and ranked.

These findings relating to enabling action are significant in that they point towards the need for attention to be paid to social processes to enable deployment of technologies for creating water sensitive cities.

3.6 Recommended actions for governments

The suggestions for action by governments are divided into federal, state and local government.

3.6.1 Federal government

The leadership role of the federal government is linked to realising the urgency of the situation. Federal government, participants suggest, should co-develop a national vision for WSC that is facilitative and prioritises policies and incentives that are designed to be locally adaptable. They should enable integration, particularly across states, implementing legislation, and enabling funding. Institutional actions required need not be focused on reshuffling and restructuring organisations (thus exacerbating institutional complexity) – they are about systemic governance reform: effecting culture, vision, understanding and incentives.

In addition, participants were keen that a national forum on Water Sensitive Cities should be urgently developed and support facilitated to enable interdisciplinary and multi-sectoral coordination and learning. It should also invest in R&D to support the ongoing learning cycle – both social and physical dimensions.

National action – some examples identified by the participants:

- *"Consolidated adaptable policy and guidelines should be done by the National Water Commission because it's a mess out there. "*
- *"COAG should establish a vision, planning guidelines and funding mechanism for Australian Water Sensitive City because this is the most strategic driver for reforming local planning and urban design."*
- *"Federal Government and State (ALL) collaborate to achieve policy targets for creating water sensitive cities / include dates / targets / subsidies / support network – Water Sensitive Cities by 2020"*
- *"Development of national principles, methodologies for analysis, policy framework by the National Water Commission"*
- *"We need a centralised data/ information website on water sensitive cities case studies. Job for National Water Commission - needs to be maintained"*

3.6.2 State government

According to participants, the state government should take a leadership role in visioning WSC at state level. It should align policies and integrate planning. It should commission large demonstration projects and invest in intellectual capital. In addition it has a role to play in awareness campaigns around being water sensitive.

State government actions – some examples identified by the participants

- *"Targets / Directives should be given by State, formulated by department of Water because they are essential to provide momentum"*
- *"Institutional/ regulatory reform should be done by state government to facilitate and streamline process to move towards adaptive infrastructure/ urban design.*
- *"More should be done by state government to enforce/ educate consequences of water abuse / mis-use, e.g. black balloon"*

3.6.3 Local government

Local government should link and integrate policy, planning and implementation, it should cooperate with other stakeholders, encourage trial developments, engage and educate the community and reinforce a new way of working. Local government councillors and senior staff should show commitment and support efforts initiated at lower levels.

Local Government actions - some examples identified by the participants:

- *"Partner with other councils to formulate an integrated approach for making a water sensitive city"*
- *"Educate the councillors and senior managers on Water Sensitive Cities"*
- *"Local government should engage the community more as they have the appropriate level of governance"*
- It should be noted that participants identified a lack of synergy between the three tiers of government and that many of the actions identified at local and state government were of the same nature.

3.6.4 Messages to Canberra from the workshop participants

The evaluation of the key messages which participants wished to convey to the Canberra workshop are as follows:

1. Recognise need for urgent action to transition to water sensitive cities in Australia.
2. Create a strong and supportive policy and regulative environment.
3. Enable and provide dedicated funding for transitioning.
4. Facilitate an integrated and coordinated approach with an emphasis on intergovernmental synergy (at all levels).
5. Develop practical suggestions which are sensitive and adaptive to local context.
6. Ensure communities are part of the debates and implementation process.
7. Provide a sense of leadership and vision on transitioning to WSC.

Much of the emphasis for action arises from a keen sense of the water shortages being experienced in the context of debates about climate change, alongside the particular mix of drivers which varies from state to state. Even if there is not always clear agreement on what the nature of action might be, it is significant that agreement on the need for action is emerging from an interdisciplinary, cross-sectoral and multi-city perspective. Creating Australian WSCs is seen as ensuring a sustainable future for Australia in terms of economy, environment and community. The following quote captures the sentiment of many:

'A water sensitive city is not desirable, it is critical and indeed inevitable, the only unknown is when'.

4. Workshop design and implementation

As noted in Section 1, a wide range of views and disciplines were represented in the workshops with appropriate representation from all sectors across the water industry.

Based on feedback from the workshop evaluation, the workshop design and participatory techniques enabled multiple perspectives of the participants to contribute to understanding of the issues and precluded narrowly held views from dominating. For example nearly 50% of evaluation respondents said they wished to use the conversation mapping technique, central to the interactive inquiries, in their own work in their own organisations. Workshop participants rated presentations and table based discussions of roughly equal utility (47 and 41% of respondents respectively).

The motivation for the NUWG/IWC partnership to organise and run these events was justified in that 53% of respondents reported that their perceptions of a water sensitive city changed and 74.6% reported an increased understanding of the characteristics of a water sensitive city.

The comments made during the workshops suggest that the workshops were extremely well received. Suggestions for improvements were made by participants, but the team was pleasantly surprised by the frequency of comments along the lines of ‘best workshop of my life’ and ‘everything worked well so no changes needed’ being reported on post-its in several cities.

The evaluation survey reveals that personal expectations of the Water Sensitive Cities workshop were met (80.8%; n=135); the two-day length of the workshop was considered appropriate (79.6%; n=133). The workshop was also considered to have had a good balance of different elements, such as information exchange, interaction and participation (85%; n=142). The majority of respondents also noted the interaction between workshop presenters and participants was satisfying (86.8%; n=145).

More information on the feedback about the workshop design and implementation is included in Annex 4.

5. Impact and understandings

The key messages in this section can be related to Figure 9. We report on changes in understanding, social relations and situation as a result of participating in the workshops. In addition we provide evidence that the workshop participants were moving towards practices which we would consider as concerted action arising from social learning.

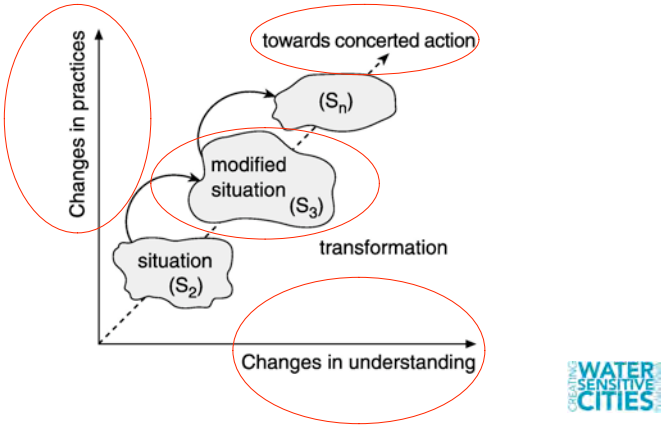

Figure 9. Factors affecting the transformation of complex, multiple stakeholder situations such as moving towards water sensitive cities (Source: SLIM 2004a). The red ellipses identify the key areas for evidence.

5.1 Changes in understanding

At a generic level, 53% of respondents reported that their perceptions of a water sensitive city had changed as a result of participation in the workshops and 74.6% reported an increased understanding of the characteristics of a water sensitive city.

Although there are many other examples to draw upon, given the professional history of the water sector and the professional interests and expertise of those present, it is particularly significant that 72% of respondents reported an increased understanding of the importance of social issues in achieving a water sensitive city. This is in comparison to 29% reporting the same for increased understanding of the technical options available for achieving water sensitive cities.

A very high proportion (75%) consider there is a need for more effective inter-disciplinary approaches and have come to better appreciate contributions other professionals can make (76%).

The workshops brought about changes in conception about water sensitive cities: e.g. 65% of respondents agreed with the statement 'I have increased knowledge about why we should move to water sensitive cities' and 70% agreed with the statement 'I have a better understanding of opportunities that exist and could be taken to move to a more water sensitive city'.

5.2 Changes in social relations

Effective networks and collaboration arise largely from changes in social relations. As a result of the workshops, attendees reported being more aware of stakeholder dependencies (67%) and having strengthened and/or made new contacts in the water sector (72%). In Adelaide a new network was initiated as an outcome of the workshop (Figure 10)

Figure. 10. Signing up to a new network following the Adelaide workshop.

5.3 Changes in practices

Only so much can be expected from a two-day event - hence it was sometimes difficult to assess changes in practice, although the evidence is that with ongoing support and facilitation considerable momentum can be built.

The evaluation evidence demonstrates a substantial shift in the 'community of conversation'[11] about water sensitive cities at interpersonal, inter- and intra-departmental and inter-organisational levels. The building of this discourse requires on-going facilitation.

The evaluation showed evidence of increased advocacy about creating WSC and changes in policy at departmental levels. As noted earlier, many participants were also planning to utilise some of the participative techniques used in the workshops in their own organisations.

As a result of the workshop, participants self-reported a range of aspirational actions in respect of transitioning towards WSC (Figure 11).

Figure 11. Types of actions planned as a result of workshop participation.

11 This could also be understood as the building of a discourse – see Krippendorff (1995) Redesigning Design; An Invitation to a Responsible Future. Pages 138-162 in Päivi Tahkokallio & Susann Vihma (Eds.) Design - Pleasure or Responsibility? Helsinki: University of Art and Design, 1995.

5.4 Shifting to concerted action?

There is substantial evidence that the workshops have developed or enhanced stakeholding in the vision of transitioning to water sensitive cities. It is clear that participants' understandings and practices (see Figure 1) have shifted or are undergoing shifts towards concerted action for creating water sensitive cities.

As noted above, the shifts are characterised by:

i. a substantial development in the conversations about water sensitive cities at interpersonal, inter- and intra-departmental and inter-organisational levels;
ii. changes in conception about water sensitive cities ;
iii. embryonic changes in policies at, mainly, departmental levels;
iv. increased advocacy for water sensitive cities at all levels.

6. Recommendations for follow-up action

In making recommendations for action, a significant majority of respondents believe it is partially feasible (compared to fully feasible or not feasible) to create water sensitive cities in Australia in the next 5-10 years. At the same time they are pessimistic about achieving this with a majority (71%) estimating that it will take 10-30 years to achieve.

The challenge for the sector as a whole is to demonstrate that this pessimism is not justified!

As shown in Figure 12, participants favoured a range of follow-up actions to the workshops.

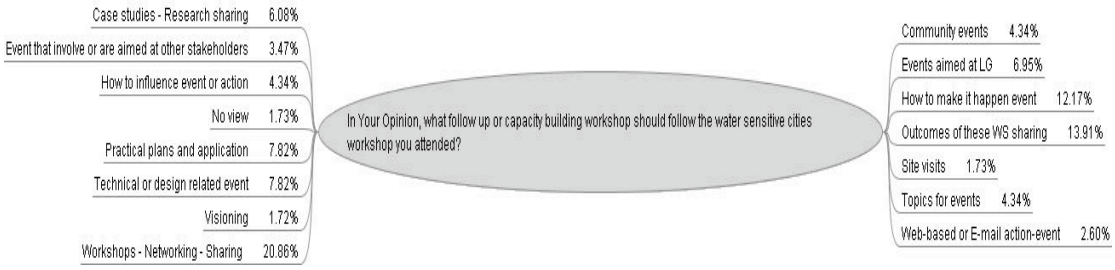

Figure 12 Mindmap outlining the main categories of follow-up capacity building action recommended by workshop participants.

When asked to nominate the most significant action they would like to see taken for their city, participants were also asked to specify 'action by whom' and 'why'. Table 3 summarises who participants considered should be taking action to transition to water sensitive cities.

Table 3. Who should take actions by city - % of participants.

Who	Adelaide	Brisbane	Melbourne	Perth	Sydney
1 : All water agencies - sector	0	8	10	15	11
2 : Bridging Organisations	0	3	0	2	0
3 : Community	0	2	3	2	0
4 : Conference organisers - Independent bodies	0	5	3	0	0
5 : Federal Government	8	8	3	2	8
6 : Government	15	5	16	8	0
7 : Industry	15	5	3	2	6
8 : Local Government - Council	23	31	12	15	25
9 : Other organisations	8	3	7	0	6
10 : Regulators	0	3	1	0	3
11 : State Government	23	15	29	42	36

12 : University - Research - Experts	8	7	6	2	3
13 : Water Providers - Retailers	0	3	7	10	3

Table 3 is telling about perceptions of power to act in each city and highlights some of the main differences between the cities. Perhaps of more importance, given the significant disconnection between the water sector and state governments in almost all cities, is the importance that is placed on state governments for action.

In the evaluation respondents were asked to nominate areas for future research. These data have not yet been fully analysed but are presented in full in Annex 5.

Based on our own analysis to date, the key messages arising out of the workshop series are as follows:

1. REALISING THE URGENCY OF THE SITUATION

Concerns over climate change, water shortages and droughts in some cities and floods in others with consequent economic, social and environmental impacts have brought concerns about water use in urban areas to the fore. Participants were convinced the time is right for change to the design and use of urban areas.

2. DESIRE FOR LEADERSHIP AND SUPPORT

It is hard to overemphasise the strength of the call for leadership and support for WSC among the workshop participants. It emerged as a key theme in the workshops and is addressed to all the levels of government and organisations involved.

3. A NATIONAL POLICY AND REGULATORY FRAMEWORK IS REQUIRED

The debates and outcomes of the workshops all endorse the idea for a national policy, and where appropriate, regulatory framework which enables leadership and integration across the states and sectors.

4. DESIRE FOR A NATIONAL NETWORK – FORUM

There is very strong support for a national network for water sensitive cities (90% of respondents) but no clear perception as to who should host such a network. It is clear that no one major industry professional body is supported to take on this task.

5. NEED FOR INTEGRATED DECISION, DESIGN AND FUNDING

Long term sustainability of the water sensitive city requires that social, economic and environmental/ ecological considerations are addressed jointly through design, decision-making and funding processes.

6. NEED FOR COOPERATION AND COORDINATION

Although not expressed in the language of a ‘good performance’ (as in an orchestra or jazz ensemble) participants in every city requested practices and arrangements which were cooperative (rather than competitive) and coordinated. This can be expressed as the desire to create better performances through systemic or joined-up thinking and action, a key capability for engaging with, and improving wicked problem situations.

7. NEED FOR ENGAGING THE COMMUNITY

A key outcome of the workshops, and the interactive processes in particular, in which different professionals encountered each other in genuine dialogue, was the realisation of what others had to offer – and an awareness that to deliver on transitioning as many stakeholders as possible, including community members, would have to be engaged. This also extends to the realisation that the business community has a role to play and can offer leadership in its own roles and practices.

8. TECHNOLOGY IS RECOGNISED AS IMPORTANT BUT NOT A BARRIER TO MOVING TOWARDS WSCs AT THE PRESENT TIME

Perhaps surprisingly, the emphasis in the workshop was not so focussed on the merits or difficulties associated with particular technologies or their specification, but more about the decision-making processes which determine whether and how more water sensitive technologies are deployed. Thus technologies were not considered the key focus for action as they were not considered a key barrier to achieving WSC.

9. RESHUFFLING INSTITUTIONAL ARRANGEMENTS FOR INTEGRATION

In all workshops the extent of institutional complexity was raised as a significant issue. In the evaluation 70% of respondents reported that they had an increased understanding of the institutional/organisational complexity in achieving a water sensitive city as a result of the workshop. Moves to transition towards water sensitive cities require new forms of governance and institutional arrangements within states and at federal level to help drive integration of social, economic and environmental imperatives in debates about water sensitive cities. Institutional change need not be the same as organisational change.

10. IMPORTANCE OF RECOGNISING CONTEXT

While there is a desire for national leadership, there is also clear recognition that national policy frameworks that do not recognise the different histories of each city and state, and that do not allow for contextual improvisation and adaptation, will not work.

The key recommendations for follow up actions, which could apply to individuals, organisations or governments at various levels, can be summarised under the following headings:

i. Realising the urgency
ii. Leading, facilitating and sustaining a vision for Australia's cities
iii. Designing in sustainability and focussing on the long-term
iv. Tackling issues holistically – enabling integration
v. Rethinking institutional arrangements
vi. Building community and industry support and
vii. Recognising situational and contextual nature of innovation and change.

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8. Annexes

ANNEX 1

Some conceptual background to the workshop design and techniques

Kevin Collins & Ray Ison

Introduction

The objectives of the workshops are set out in Section 1 above. The key partners in this endeavour, staff of the National Urban Water Governance Program (NUWGP) and the International WaterCentre (IWC) wanted to convene events that offered participants value for money as well facilitating the on-going transition of Australia's cities towards water sensitive cities (Figure 1). Importantly they recognised that dissemination of research is not merely a linear, transfer process.

Following a series of negotiations between the authors an invitation to fulfil the role of **learning system designers and facilitators** was accepted. The aim was to design a series of national workshops organised for the purpose of facilitating transition towards water sensitive cities (WSC) in five major Australian cities (Perth, Brisbane, Sydney, Melbourne, Adelaide) and in national policy, through the National Water Commission (NWC) based in Canberra.

The design, conduct and evaluation of this series of events across Australia was conceptualised and conducted as a research process in learning system design. The research we report is based on the addition of expertise in:

i. the design and facilitation of learning systems for situation improving action in complex, contested and uncertain situations (as typified by the urban water design and management situations),
ii. researching, developing and implementing systemic practices and social learning,

Research at Monash has highlighted technical and social constraints to the transition of Australian cities towards more water sensitive status as well as developing new technologies, designs and governance arrangements (Figure 1; Wong and Brown 2009).

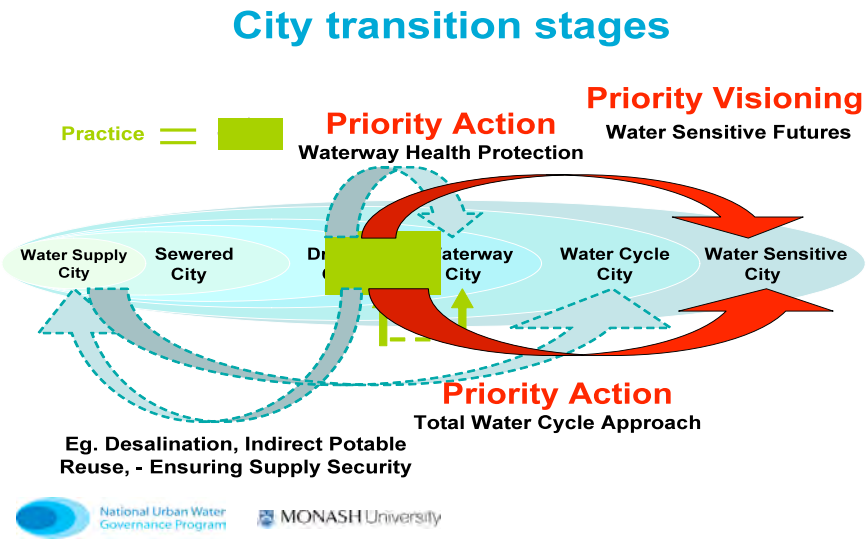

Figure 1. The key model of the different city states in Australia – adapted from Wong & Brown (2009)

Based on Figure 1, the key transformation which our learning system design set out to enhance can be described as:

cities which are not water sensitive > Transformation (T) > cities which are water sensitive.

To enable this transformation, a series of activities are needed in (T) which lead to changes in understanding and changes in practices . This shift is depicted in Figure 2 where situations (S) are transformed through changes in practices and understanding and so on. The existing situation (S1) is the starting or point of origin. The dotted arrow indicates that the transformation is based on moving towards concerted action – i.e. different actions which are undertaken by individuals but are done so with awareness of each others' activities and a sense of the overall picture to which people are working.

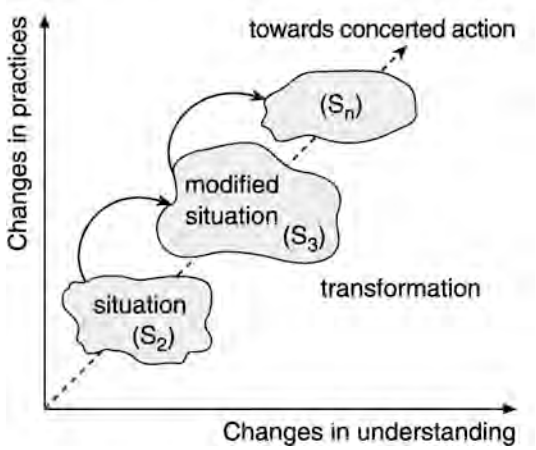

Figure 2. Situations characterised by complexity, uncertainty interdependencies, multiple stakeholders and thus perspectives can be transformed through concerted action by stakeholders who build their stakeholding in the process. This leads to changed understandings (knowledge in action) and practices (S = situation; Source: SLIM 2004a). Note: this figure is not intended to be read in Cartesian terms: i.e., the dotted arrow could take any shape or direction. The depiction here is for purposes of simplicity.

Workshop design

The conceptual framing of the situation was based on discussions with the NUWGP and IWC, and the facilitators' experiences of engaging with water managing issues using systems thinking for designing learning systems in various natural resource management contexts in Australia and internationally (Collins and Ison 2009). The workshops in each state capital were concerned with enabling learning among participants to effect the transformations described in Figure 2.

Specific design considerations included:

1. design for c.150 participants to attend two-day workshops;
2. need for presenters to be heard and valued;

3. need for participants' views and experiences to be heard and valued;
4. need for interactive sessions to bring about deeper understanding of what emerges in (2) and (3);
5. requirement that participants leave with a clear sense of grounded activities they can engage in to bring about transformation (systemic changes) in their own situations.

The transformation we seek in our work is towards concerted action among multiple stakeholders in complex, contested situations (e.g. wicked problem situations, APSC 2007). Concerted action can be likened to an orchestra. Each player may be engaging in different activities (playing different instruments) at different times, but collectively they are aware of each others' roles in relation to the desired whole (the performance of the music). Thus, an orchestra is an example of concerted action in practice.

To undertake a performance, members of an orchestra engage in learning processes which variously require them to establish how they (collectively) understand the situation, their desired goal, learn about their own activities and to coordinate these with others in preparation and in final performance. The process of collective learning can be understood as social learning. To be successful requires the orchestra to engage in effective social learning processes; for others to invest in the orchestra as a mechanism of social learning; and for the audience to receive the ensuing performance as effective.

Similar requirements are necessary to address environmental situations. To bring about the desired transformation of moving towards water sensitive cities requires some awareness of:

- the complexity of the situation
- interdependencies
- multiple stakeholding
- possible controversies.

If a situation is experienced as having these characteristics, then a social learning approach is appropriate to help bring about the desired transformation. In parallel with the orchestra, the two-day workshops represent, in our terms, three things: an investment in social learning; a learning system in terms of workshop design; and social learning as an outcome evidenced by a shift in understanding and practices of everyone in the workshop in relation to creating water sensitive cities.

This rationale suggests that attention has to be paid to design events such as a workshop as a learning system with awareness of the investments already made to date and the desired outcomes. Figure 3. shows the set of activities that were central to our learning system design.

Our 'learning system' design for the workshops

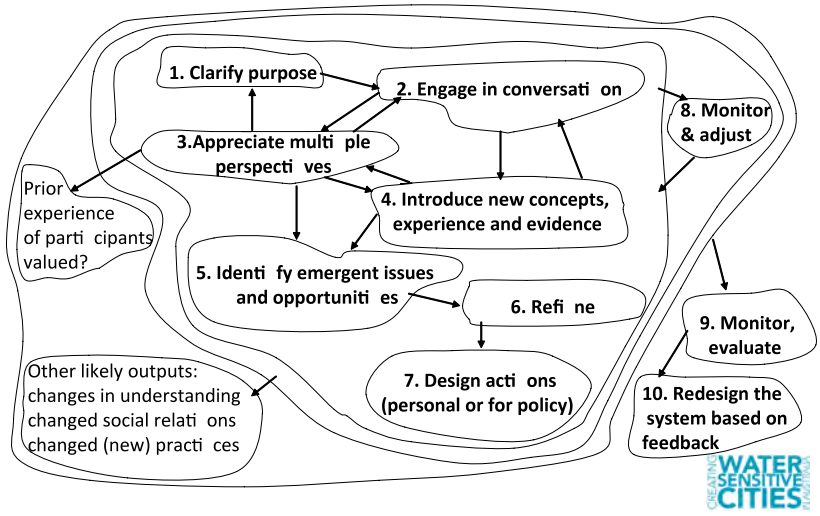

Figure 3. An activity model of the 'creating water sensitive cities learning system' design – note that all activities are depicted by a verb and that monitoring and adaptation was built in at the end of day I and at the completion of each workshop.

The design followed research on social learning concerned with transforming complex and uncertain situations by paying attention to particular enabling or constraining factors (Figure 4). Figure 4 shows examples of each of the 'variables' or factors which our research has shown can constrain, or enhance the transformation of situations towards social learning with more specific examples taken from the data generated in the five-city workshops.

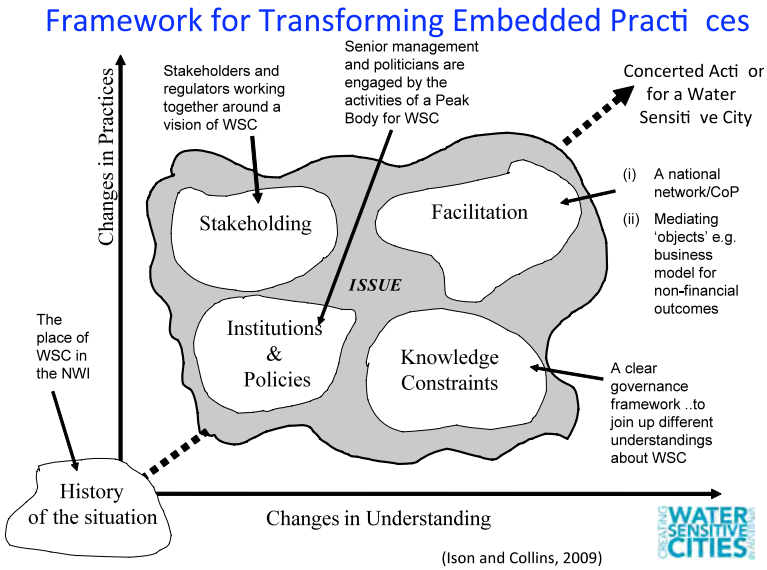

Figure 4. SLIM (Social Learning for the Integrated Management and sustainable use of water) research demonstrates how five 'key' variables interact and are mediated by learning processes to shape issues and transform particular situations. These variables include history, stakeholding, facilitation, institutions and policies, and ecological constraints (reframed as epistemological or knowledge constraints in subsequent research). The examples here are from the CWSC workshops. (Source: Adapted from SLIM 2004a).

The nature of the variables depicted in Figure 4 are described in a series of publications (SLIM 2004a,b,c,d,e,; see also Steyaert and Jiggins, 2007). It is worth pointing out here however how 'institutions' are understood in this work (Box 1).

Box 1. Institutional complexity

There are multiple uses and interpretations of the term 'institution'. In English, it is often used interchangeably with 'organisation'. In this briefing, we use the term institution to describe an 'established law, custom, usage, practice, organization, or other element in the political or social life of a people'; 'a regulative principle or convention subservient to the needs of an organised community' (The Oxford English Dictionary). An organisation is understood as a hierarchical network of behaviour and roles to elicit desired individual behaviour and coordinated actions obeying a system of rules and procedures. Institutions can be policies and objectives, laws, rules, regulations, organisations, policy mechanisms; and norms, traditions, practices and customs. They influence how we think and what we do. Policies are a significant and pervasive form of institution.

Because institutions are so pervasive the addition of new ones can often exacerbate, rather than ameliorate, complexity.

Source: SLIM (2004b)

Managing the data analysis and evaluation

Data compilation and analysis commenced immediately after the final workshop. Products to be developed as a result of the workshops include a city-based analysis and a comparative analysis between all cities. Our priority has been, consistent with our undertaking to participants, to post the raw data on the web so that all who participated can access this material. Our second post-workshop priority was to develop a web-based evaluation instrument to be delivered via personal contacts to all participants (Annex 2).

The analysis has involved three cycles which are not yet complete: (i) first pass analysis of (a) recommended actions to transition to a water sensitive city, (b) characteristics of a water sensitive city, (c) issues and opportunities in transitioning to a water sensitive city; (d) feedback on day 1 and 2 of the workshop; (ii) second pass analysis, exploring emergent issues arising from the first pass; and (iii) analysis of the longitudinal evaluation (i.e., follow-up survey).

The Water Sensitive Cities website www.watersensitivefutures.org was redesigned to feature workshop outputs and provide access to presentation material, preliminary workshop outcomes from each city, photos etc. Until the overall analysis is complete, only participants who attended a workshop will have access to the raw data from their cities.

Diagramming: Conversation maps

Conversation mapping as a technique was 'invented' by Richard Bawden and refined by staff of the Systemic Development Institute and at the Open University (UK). The text below is from the Open University publication: (2006) Techniques for environmental decision making. Open University, UK.

Experience has shown that participants in a group process have many creative ideas, value being listened too, and benefit from relationship building with others. Work conducted by members of the Open Systems Research Group (OSRG) and other systems practitioners has shown that using conversation mapping is a productive way to start a group-based inquiry into a complex situation.

The room needs to be set up in advance to facilitate several groups of up to seven working together. They will arrange themselves around a table with a large sheet of paper in the centre. In the middle of the paper someone writes down and circles the idea that will be the conversation trigger. Each person will select a coloured pen. One member of the group will suggest a response to the trigger (what is here called a "theme") and will write the essence of their response on the paper, linking it with a single line to the circle (as in spray diagramming). Other members of the group will then add their comments to the first so that the theme is discussed fully and that discussion recorded as it proceeds. When the theme is exhausted, another will be written onto the map and similarly discussed. The process continues until every possible theme has been discussed and the contributions recorded.

At the end of the allocated time the group will have produced a colourful 'mess' that represents the complexity of the original 'trigger' idea from the perspective of those involved - a conversation map. From this complex mess the group will look for insights/issues that seem to be the basis of large sections of the map. A start to finding these emergent issues is to select a theme (or one branch of it) and ask the question:

'why are we saying the comments that we have recorded?'

Then check to see if the same answer applies to the 'why' question in other parts of the map. If the same answer emerges from parts of three or more themes record it along with the specific comments on the map where you identified the issue.

In this activity the emerging insights are referred to as 'opportunities' because they have the leverage to cause significant change in the 'trigger' idea if they are developed. These opportunities are recorded in detail by the group on a large sheet of paper for sharing with all workshop participants.

Sometimes it is useful to stop at this point. Alternatively the following process can be pursued.

The group will next focus on each insight separately and record a description of each in a way that answers the following questions (if the group has identified many opportunities it should start with those that have the greatest leverage capacity on the 'trigger idea'):

1. What change (transformation) does this insight imply for the system of interest?

A change statement includes three elements:

a) what is the current status of what you want to change?
b) what is the desired status after the change? and
c) how the change can be instigated?

2. Why is this change an improvement for the system?

This comment identifies the value of the suggested change.

3. Who will be the people involved in this change (the same person may appear in more than one list):

- having the power to cause or stop the change?
- being affected in a positive or negative way by the change?
- doing the work required to implement change?
- watching over the change for unintended consequences?

4. What are the external forces that will help or restrict the change occurring?

This refers to events that are outside the control of the system of interest and are considered to be capable of either positively or negatively affecting the desired change.

5. What are the activities that must be completed for the change to occur?

All activities that the group can brainstorm should be listed. Once the list is completed and the group is satisfied that if all were completed the change would be achieved, related activities are clustered together so that there are six or seven clusters created (some activities may stand alone as they represent a discrete function that must be completed).

The 'clusters of activities' can then be modelled to show the relationship between them. This is done by setting the clusters around a circle and drawing an arrow from one to another that it has a relationship with. The relationship is established by asking what does, say, cluster A need from cluster B to do its job effectively? If the answer is "nothing", then no relationship exists between the clusters in the questioned direction. If the answer is, say, "authority to spend money" then an arrow is shown in the direction of the authority and the details of the relationship recorded. This question is asked of every possible combination of the 'clusters of activities'. The resultant diagram is a conceptual model of the change system that you are proposing.

Finally, go back to the conversation map and identify what aspects of the map may change if the system you have mapped is instigated in the future. Rate the significance of the change in terms of improving the 'trigger idea' on a 5 points scale where 5 represents the highest degree of improvement.

Source: B. McKenzie (personal communication to Ray Ison) – see Systemic Development Institute at http://www.systemics.com.au/intro.html (accessed 15th June 2005).

ANNEX 2

Questions and Summary Data from on-line evaluation

A follow-up on-line evaluation survey was designed and made available (using SurveyMonkey[12]) to all workshop participants. It was completed on Tuesday 12th May. Data analysis is ongoing.

Creating Water Sensitive Cities Workshop Evaluation

1. Explanatory Statement

Dear Colleague,

This survey is part of a wider research project, which aims to address current knowledge gaps in creating Water Sensitive Cities in Australia. More details on creating water sensitive cities can be found on: http://www.watersensitivefutures.org/

We are requesting your participation in this voluntary and anonymous on-line questionnaire, which is expected to take approximately 20-30 minutes to complete.

Monash University's Ethics Committee has approved this research project (project number 2006000109 C1/2006). All results will be securely stored by the researchers and available to no other persons, unless the researchers give permission. In accordance with Monash University policy, the questionnaire data will be destroyed in 5 years. The data may also be used to contribute to the findings reported in journal articles, conference presentations or used in future research projects. Should you have any complaints concerning the manner in which this research is conducted, please do not hesitate to contact Monash University's Ethics Committee at the following:

The Secretary
The Standing Committee on Ethics in Research Involving Humans (SCERH)
Building 3d, Research Grants and Ethics Branch
Monash University Victoria 3800
Tel: +61 3 9905 2052 Fax: +61 3 9905 1420
Email: scerh@adm.monash.edu.au

If you require more information about the project or should you request a summary of the results of this research project, you can contact:

Professor Ray Ison
Monash Sustainability Institute (incl. UNIWATER & School of Geography & Environmental Science)
Monash University
E-Mail: R.L.Ison@open.ac.uk

or

Associate Professor Rebekah Brown
School of Geography and Environmental Science
Monash University
Email: nuwgp@arts.monash.edu.au

Thank you for your time. Your input into this research is very much appreciated.

	Response Percent	Response Count
Yes, I have read and agree to the information in the Explanatory Statement for this research.	100.0%	178
answered question		178

12 See http://www.surveymonkey.com/ (accessed 17th May, 2009)

The survey was attempted by 178 respondents representing a healthy 33.6% overall response rate. On a city/state basis the response rates were: Perth (38.6%), Brisbane (23.6%), Melbourne (34.6%), Sydney (40.3%) and Adelaide (20.8%). [13]

2. In which city did you participate in the Water Sensitive Cities workshop?

	Response Percent	Response Count
Perth	15.8%	27
Brisbane	14.6%	25
Melbourne	32.7%	56
Sydney	28.1%	48
Adelaide	8.8%	15
answered question		171
skipped question		7

3. Which stakeholder group do you represent?

	Response Percent	Response Count
Federal Government	2.3%	4
State Government	17.5%	30
Local Government	35.7%	61
Water Utility	15.8%	27
Developer	1.2%	2
Consultant	14.0%	24
Researcher / Academic	5.3%	9
Non Government Organisation	3.5%	6
Manufacturer	0.6%	1
Other (please specify)	4.1%	7
answered question		171
skipped question		7

13 The response rates reported are lower than actual if the Monash team is deducted – as they inflate participation numbers slightly in each city.

2. In which city did you participate in the Water Sensitive Cities workshop?

	Response Percent	Response Count
Perth	15.8%	27
Brisbane	14.6%	25
Melbourne	32.7%	56
Sydney	28.1%	48
Adelaide	8.8%	15
answered question		171
skipped question		7

4. At what level are you positioned within your organisation's hierarchy?

	Response Percent	Response Count
Executive/Senior Management	19.9%	34
Middle Management or Supervisor	39.2%	67
No management responsibility	40.9%	70
answered question		171
skipped question		7

5. Broadly, what is the main type of work that you do?

	Response Percent	Response Count
Elected official (i.e. politician)	0.0%	0
Strategy / Policy	38.6%	66
Design / Technical / Operations	31.6%	54
Regulation / Auditing	2.9%	5
Research / Science	8.2%	14
Education / Marketing / Communications	9.4%	16
Other (please specify)	9.4%	16
answered question		171
skipped question		7

6. In which area of the water cycle do you primarily work?

	Response Percent	Response Count
Stormwater / Waterways	29.2%	50
Sewerage	4.1%	7
Water Supply	5.3%	9
Land Development	14.0%	24
Total Water Cycle Management	35.7%	61
Other (please specify)	11.7%	20
answered question		171
skipped question		7

7. Do you design and implement stakeholder processes?

	Yes	No	Response Count
With communities	53.8% (92)	46.2% (79)	171
With other professionals	77.2% (132)	22.8% (39)	171
With other sectors	57.3% (98)	42.7% (73)	171
With other departments within my organisation	75.4% (129)	24.6% (42)	171
With other organisations in the water sector	68.4% (117)	31.6% (54)	171
		Others (please specify)	1
		answered question	171
		skipped question	7

8. What is your PRIMARY professional training/qualification (i.e. the qualification you draw upon most to do your work)?

	Response Percent	Response Count
Planning	5.3%	9
Policy	2.3%	4
Engineering	33.3%	57
Natural Resource Management	16.4%	28
Social Science	4.7%	8
Humanities	0.0%	0
Science (environmental, biological, physical, health etc)	24.6%	42
Education	0.6%	1
Law	0.6%	1
Management	1.8%	3
Business / Economics	2.3%	4
Marketing / Communications	0.6%	1
Urban Design / Architecture / Landscape Architecture	7.6%	13
I do not have professional training/qualifications	0.0%	0
answered question		171
skipped question		7

9. If you have additional professional training/qualifications, please select the most relevant (select one).

	Response Percent	Response Count
None	25.1%	43
Planning	8.2%	14
Policy	1.8%	3
Engineering	8.8%	15
Natural Resource Management	10.5%	18
Social Science	4.1%	7
Humanities	1.8%	3
Science (environmental, biological, physical, health etc)	12.3%	21
Education	2.3%	4
Law	0.0%	0
Management	11.1%	19
Business / Economics	2.9%	5
Marketing / Communications	1.2%	2
Urban Design / Architecture / Landscape Architecture	4.1%	7
Other (please specify)	5.8%	10
answered question		171
skipped question		7

10. How many years experience do you have working in the area of urban water management?

	Response Percent	Response Count
0-1 year	11.1%	19
2-5 years	36.3%	62
6-10 years	21.1%	36
11-15 years	9.9%	17
16-20 years	5.3%	9
20+ years	12.9%	22
I do not work in urban water management (please specify in which sector you work)	3.5%	6
answered question		171
skipped question		7

11. How many days did you attend the workshop for?

	Response Percent	Response Count
Both days	89.5%	153
Only day one	7.6%	13
Only day two	2.9%	5
answered question		171
skipped question		7

12. What made you decide to come to the workshop?

	Response Count
	171
answered question	171
skipped question	7

13. Please give us YOUR opinion on a scale of 1 (totally disagree) to 7 (totally agree) about the following statements:								
	Totally disagree	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Totally agree	Response Count
Overall, my personal expectations of the Water Sensitive Cities workshops were met.	1.2% (2)	0.0% (0)	6.0% (10)	12.0% (20)	**45.5% (76)**	29.3% (49)	6.0% (10)	167
The two-day length of the workshop was right.	1.2% (2)	1.2% (2)	8.4% (14)	9.6% (16)	**38.3% (64)**	32.9% (55)	8.4% (14)	167
The workshop had a good balance of different elements, such as information exchange, interaction, and participation.	1.2% (2)	0.0% (0)	4.2% (7)	9.6% (16)	36.5% (61)	**39.5% (66)**	9.0% (15)	167
The interaction between workshop presenters and participants was satisfying.	1.2% (2)	0.6% (1)	3.0% (5)	8.4% (14)	**41.3% (69)**	39.5% (66)	6.0% (10)	167
The overall interactions between the workshop participants were satisfying.	1.2% (2)	0.6% (1)	3.0% (5)	6.0% (10)	**41.3% (69)**	38.9% (65)	9.0% (15)	167
The contracting rules eg 'giving others the experience of being listened to' as set out in the beginning of the workshop served as useful guidance during our table discussions.	1.8% (3)	1.2% (2)	3.0% (5)	15.0% (25)	**37.7% (63)**	32.3% (54)	9.0% (15)	167
The presentations were of good value to the overall workshop.	0.6% (1)	0.0% (0)	6.0% (10)	4.2% (7)	37.7% (63)	**41.9% (70)**	9.6% (16)	167
The logistical arrangements for the workshop were satisfying.	0.0% (0)	0.6% (1)	3.0% (5)	9.6% (16)	**47.3% (79)**	32.9% (55)	6.6% (11)	167
If you disagree with the statement for logistical arrangements, what was the reason for your dissatisfaction?								10
							answered question	167
							skipped question	11

14. What subject area would you add to future presentations?

	Response Count
	110
answered question	110
skipped question	68

15. Which workshop activity did I find most useful?

	Response Percent	Response Count
Presentations	47.3%	79
Plenary sessions	5.4%	9
Table-based discussions	40.7%	68
Informal networking during drinks, lunch, etc.	5.4%	9
Other (please specify)	1.2%	2
answered question		167
skipped question		11

16. How would you rate the effectiveness of the table-based discussion elements:

	Very ineffective	Ineffective	Neutral	Effective	Very effective	Response Count
Contracting	1.8% (3)	6.1% (10)	32.3% (53)	53.7% (88)	6.1% (10)	164
Conversation mapping	1.2% (2)	1.8% (3)	12.7% (21)	60.6% (100)	23.6% (39)	165
Scouting other tables	1.2% (2)	7.5% (12)	32.9% (53)	49.1% (79)	9.3% (15)	161
Systems mapping (Only for participants from Melbourne, Sydney and Adelaide)	4.1% (5)	2.5% (3)	34.7% (42)	52.1% (63)	6.6% (8)	121
answered question						167
skipped question						11

17. Which element of the table-based discussions are you likely to use yourself:			
		Response Percent	Response Count
Contracting		14.0%	23
Conversation mapping		50.0%	82
Scouting other tables		13.4%	22
Systems mapping (Only for participants from Melbourne, Sydney and Adelaide)		15.9%	26
All		20.1%	33
None		18.3%	30
	answered question		164
	skipped question		14

18. Any comments and suggestions in regard to the presentations or general design of the workshop?		
		Response Count
		72
	answered question	72
	skipped question	106

19. Prior to the workshop I rated my knowledge of Water Sensitive Cities as:

	Response Percent	Response Count
No understanding	0.6%	1
Little understanding	15.2%	25
Modest understanding	47.9%	79
Significant understanding	34.5%	57
Full understanding	1.8%	3
answered question		165
skipped question		13

20. Please give us YOUR opinion on a scale of 1 (totally disagree) to 7 (totally agree) about the following statements answering: AS A RESULT OF THE WORKSHOP...

	Totally disagree	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Totally agree	Response Count
My perception of a water sensitive city changed.	0.6% (1)	1.8% (3)	16.4% (27)	27.9% (46)	40.0% (66)	12.7% (21)	0.6% (1)	165
I have an increased understanding of the characteristics of a water sensitive city.	0.6% (1)	0.6% (1)	9.7% (16)	14.5% (24)	47.3% (78)	21.2% (35)	6.1% (10)	165
I have an increased understanding of the importance of social issues in achieving a water sensitive city.	0.6% (1)	1.2% (2)	9.1% (15)	17.0% (28)	44.2% (73)	23.0% (38)	4.8% (8)	165
I have an increased understanding of technical options available for achieving water sensitive cities.	2.4% (4)	0.6% (1)	13.9% (23)	23.6% (39)	44.8% (74)	12.7% (21)	1.8% (3)	165
I have increased knowledge about why we should move to water sensitive cities.	1.8% (3)	1.2% (2)	12.1% (20)	20.0% (33)	41.8% (69)	14.5% (24)	8.5% (14)	165
I have a better understanding of opportunities that exist and could be taken to move to a more water sensitive city.	1.2% (2)	1.2% (2)	9.7% (16)	18.2% (30)	50.3% (83)	15.8% (26)	3.6% (6)	165
I have an increased understanding of the institutional/organizational complexity in achieving a water sensitive city.	0.6% (1)	1.2% (2)	7.9% (13)	20.0% (33)	41.2% (68)	20.6% (34)	8.5% (14)	165

I have an increased understanding of possible controversies of creating water sensitive cities.	0.6% (1)	0.6% (1)	9.1% (15)	24.2% (40)	44.2% (73)	18.2% (30)	3.0% (5)	165
I am more aware of stakeholder dependencies to achieve a water sensitive city.	0.6% (1)	0.6% (1)	7.3% (12)	24.8% (41)	47.3% (78)	14.5% (24)	4.8% (8)	165
I understand the positions of other stakeholders in the city better.	0.0% (0)	0.0% (0)	9.1% (15)	26.7% (44)	43.6% (72)	16.4% (27)	4.2% (7)	165
I believe that stakeholders in the city are now more connected to each other.	0.6% (1)	3.6% (6)	13.9% (23)	38.2% (63)	30.3% (50)	11.5% (19)	1.8% (3)	165
I have recognized the need for more effective inter-disciplinary approaches.	0.6% (1)	0.6% (1)	6.1% (10)	17.6% (29)	43.0% (71)	25.5% (42)	6.7% (11)	165
I have come to better appreciate contributions other professionals can make.	1.2% (2)	0.6% (1)	6.7% (11)	27.9% (46)	43.6% (72)	16.4% (27)	3.6% (6)	165
I have strengthened and/or made new contacts in the water sector.	1.2% (2)	0.6% (1)	7.3% (12)	18.8% (31)	46.7% (77)	20.0% (33)	5.5% (9)	165
I have an increased appreciation of how science/practitioner interactions can contribute to achieving a water sensitive city.	0.6% (1)	1.2% (2)	7.3% (12)	21.2% (35)	51.5% (85)	14.5% (24)	3.6% (6)	165
I have a greater sense of urgency to move to a water sensitive city.	1.2% (2)	0.0% (0)	6.7% (11)	23.6% (39)	36.4% (60)	23.0% (38)	9.1% (15)	165
I have greater understanding of some facilitation techniques that could make my organisation more effective.	0.6% (1)	0.6% (1)	5.5% (9)	26.1% (43)	38.2% (63)	23.6% (39)	5.5% (9)	165
							answered question	165
							skipped question	13

21. What, if any, new practices have been carried out as a result of your participation in the workshop?

	At an individual level	Within my department	Between departments	With other organisations	Response Count
I talked with people about water sensitive cities.	61.6% (90)	60.3% (88)	33.6% (49)	37.0% (54)	146
I have changed the way I talk about urban water management.	56.8% (50)	46.6% (41)	35.2% (31)	28.4% (25)	88
I am drawing systems maps.	69.0% (20)	24.1% (7)	6.9% (2)	10.3% (3)	29
I have used the facilitative techniques such as conversation maps as used in the workshop.	51.4% (19)	45.9% (17)	8.1% (3)	24.3% (9)	37
I am changing policy.	21.1% (12)	50.9% (29)	47.4% (27)	15.8% (9)	57
I have taken an active role in advocacy of water sensitive cities.	46.2% (43)	46.2% (43)	41.9% (39)	34.4% (32)	93
I have taken up other practices resulting from the workshop (please specify these practices)					11
				answered question	150
				skipped question	28

22. I have implemented one of the actions that I identified at the end of the workshop?

	Response Percent	Response Count
Yes	31.5%	52
No	22.4%	37
Can't remember my identified action(s)	46.1%	76
answered question		165
skipped question		13

23. As a result of the workshop I still plan to:	
	Response Count
	78
answered question	78
skipped question	100

24. To what extent do you think creating a Water Sensitive City is feasible for your city in the next 5 - 10 years?		
	Response Percent	Response Count
Not feasible	7.1%	10
Partially feasible	72.1%	101
Fully feasible	19.3%	27
I don't know	1.4%	2
answered question		140
skipped question		38

25. Please provide your best estimate of how long it will take for your city to become a Water Sensitive City.

	Response Percent	Response Count
0-5 years	2.9%	4
5-10 years	10.7%	15
10-20 years	43.6%	61
20-30 years	27.1%	38
30-50 years	11.4%	16
50-75 years	3.6%	5
>75 years	1.4%	2
Never	2.1%	3
answered question		140
skipped question		38

26. After some time to reflect on the workshop, in your opinion what are the 3 most important characteristics of a Water Sensitive City?

	Response Percent	Response Count
1	100.0%	140
2	95.0%	133
3	91.4%	128
answered question		140
skipped question		38

27. After some time to reflect on the workshop, in your opinion what are the 3 most important actions for your city to become a water sensitive city?

	Response Percent	Response Count
1	100.0%	140
2	95.0%	133
3	90.0%	126
answered question		140
skipped question		38

28. After some time to reflect on the workshop, in your opinion what are the 3 most important actions for the sector as a whole to achieve a water sensitive city?

	Response Percent	Response Count
1	100.0%	140
2	87.1%	122
3	77.9%	109
answered question		140
skipped question		38

29. What is the most important factor that constrains your ability to take action?

	Response Count
	128
answered question	128
skipped question	50

30. What is the most important factor that would enable you (or that already enables you) to take action?	
	Response Count
	123
answered question	123
skipped question	55

31. What is the main message you would like the Canberra forum to hear?	
	Response Count
	140
answered question	140
skipped question	38

32. If there was a national network for water sensitive cities would you be likely to join it?		
	Response Percent	Response Count
Yes	90.5%	124
No, please go directly to question 11	9.5%	13
If yes, what would you like to get out of this network?		74
answered question		137
skipped question		41

33. Which organisation would be the best to host a national network for Water Sensitive Cities?

	Response Percent	Response Count
Australian Water Association	30.3%	37
Stormwater Industry Association	6.6%	8
Engineers Australia	3.3%	4
Planning Institute of Australia	4.9%	6
National Water Commission	15.6%	19
International WaterCentre	5.7%	7
National Urban Water Governance Program	18.0%	22
Other (please specify)	15.6%	19
answered question		122
skipped question		56

34. In your opinion what follow-up or capacity building event should follow the water sensitive cities workshop you attended?

	Response Count
	106
answered question	106
skipped question	72

35. From your perspective what new research questions have arisen that if addressed might assist in transitioning to a water sensitive city?

	Response Count
	100
answered question	100
skipped question	78

36. Is there any other comment you would like to make regarding the workshop?

	Response Count
	72
answered question	72
skipped question	106

ANNEX 3

Further background on workshop participants

Background information on participants' professional backgrounds, areas of work and types of work undertaken was also collected during the registration process. The preliminary results are provided below.

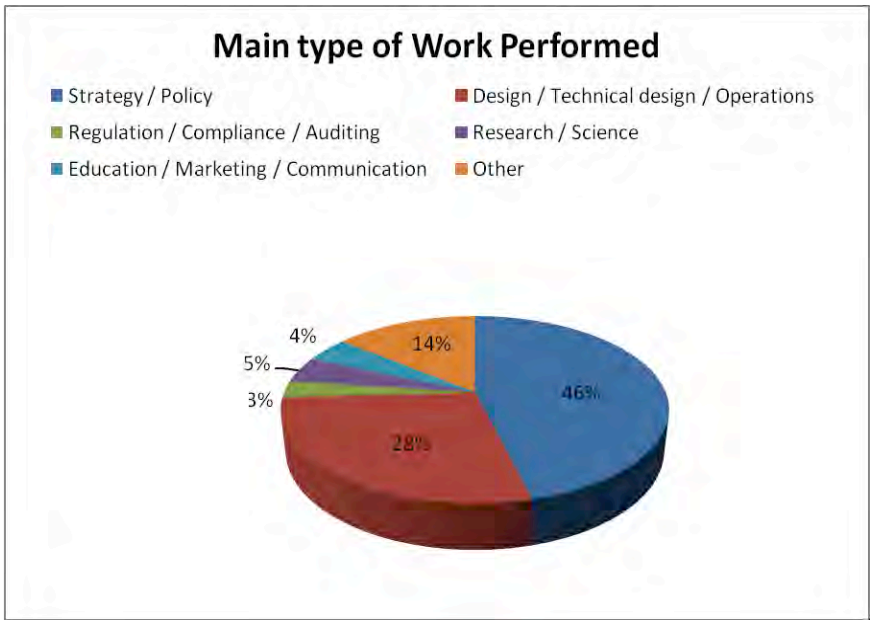

Figure 3.1: The main type of work performed by all workshop participants combined.

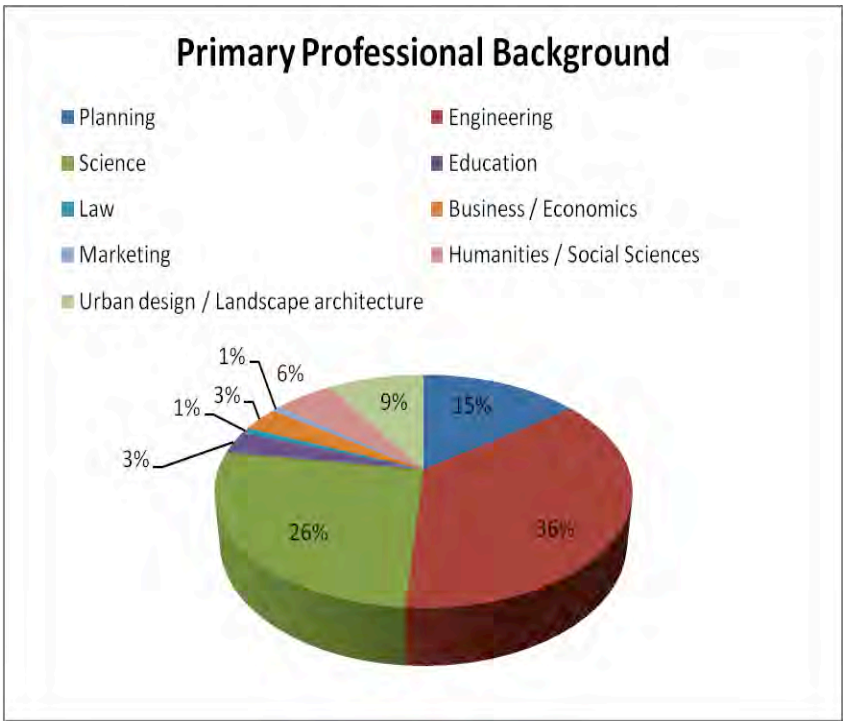

Figure 3.2: Primary professional background of all workshop participants combined.

ANNEX 4

Summary of Feedback

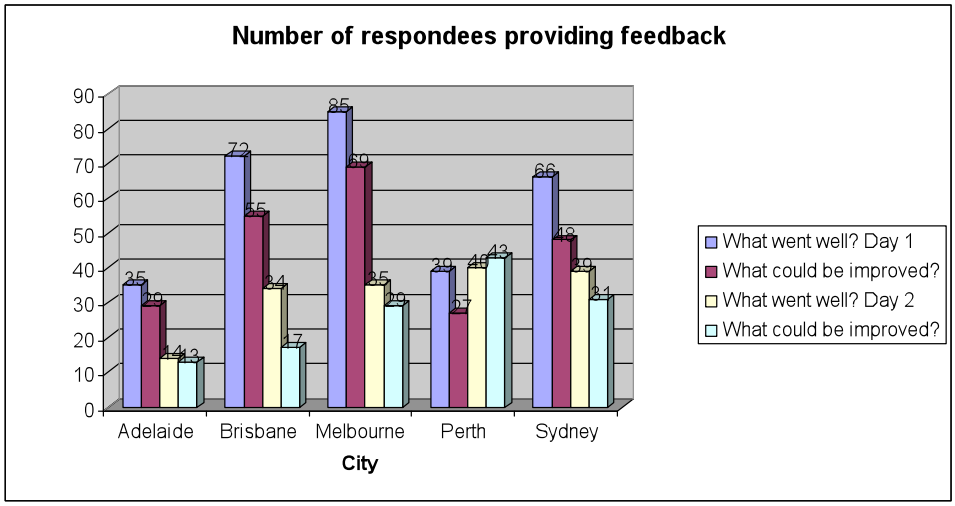

Figure 12. An analysis of the numbers of participants providing feedback to the facilitators at the end of day 1 and day 2 in each workshop.

It is perhaps significant that more feedback was provided at the end of Day 1 (except for Perth where more participants rotated days) and that there was more 'what went well' feedback than 'what could be improved' feedback. The following tables need to be interpreted with care in that they show the full range of feedback (of both types) but do not indicate the frequency of any of the particular feedback items. In terms of the overall evaluation of the data from the follow-up survey are thus more reliable in relation to overall effectiveness.

Table 1. An analysis of the 'What went well?' feedback received during and immediately after the workshops.

Category of feedback	Description of category	Items
Workshop activities	The content of the workshop session(s) was good.	Conversation mapping. Presentation. Panel discussion. System maps. Action items/ session. Scouting session. Question time session.
Format/ design and implementation of workshop	The overall workshop format and focus was well structured and met its objectives by the mix of structure and interaction.	Focus. Table/ group mix. Facilitation. Interaction with presenters. Feedback. Participation/ interaction.

		Continuation from day 1. Variety of topics/ format of program.
Practical organisation of workshop	The organisation of the workshop both pre-workshop and on the days including the venue, catering and reading material.	
Inspirational	The workshop was uplifting, enjoyable and a motivational experience.	
Diversity of participants	The number and diversity of the participants and peers and the organisations that they represent.	
Learning	The opportunity to learn from sessions and from other participants.	Formal learning. Local input. Research. Informal learning.
Networking	The opportunity to network and represent my organisation.	

Table 2: An analysis of the 'What could be improved?' feedback received during and immediately after the workshops.

Category of feedback	Description of category	Items
Workshop activities.	The content of the workshop session(s) was unsatisfactory.	Presentations. Conversation mapping. Lack of question time to panel. Unclear instructions for sessions. Ranking session. System maps session.
Format/ design of workshop.	The overall workshop format and focus did not meet its objectives by the compliment of structure and interaction.	Wider perspective required. Lack of feedback. Quantity of participation. Level of facilitation. No variation of table participants.
Practical organisation of workshop	Some or an aspect of the organisation of the workshop both pre-workshop and on the days including the venue, catering and reading material was unsatisfactory.	On day organisation. Venue (including catering). Reading material.
Diversity of participants.	Many organisations/ stakeholders not represented.	
Networking	Lack of networking opportunities.	
Learning	Learning opportunities that were missed or incomplete.	Not specific to location. Lacking examples. Lack of research data.

		Definitions lacking. Future: the way forward not developed.
All good	Not aware of any aspects of the workshop that could be improved.	
Post workshop interaction.	An opportunity to initiate a post workshop forum was missed.	

ANNEX 5

Achieving Water Sensitive Cities

From your perspective what new research questions have arisen that if addressed might assist in transitioning to a water sensitive city?

We need to know that WSCs are feasible on a precinct scale at a local context. We need to know they will function as said.

The link between the health of aquatic ecologic communities and dissagregation of stormwater from impervious areas was only made associatively. This was very poor science; needs to be supported. The irrigation aspects of WSCs were also poorly explored although linking with the Irrigation CRC Urban program may address this.

How can we tie the multiple benefits of a water sensitive city to other intrinsically linked aspects of the urban fabric (energy; transport etc)

How to "hook" key stakeholders who have not previously participated in the process

How to transform local government from policy to assessment and implementation

Market receptivity for WSUD Public acceptance and useability of WSUD at the lot and neighbourhood scale.

urban microclimate. semiology and relevance of the presence of waters in urban areas in changing hearts and minds

Issues of central control vs autonomous development control vs individual lot actions. Would like to see research on implications for the system and community and dollars. Current system puts onus onto individual lot development.

Engineering of roads to allow for permeable pavements; capability of street trees and pits to process urban runoff; increased palette of permeable paving materials.

Impact of large scale water reuse on the environment and community

The review of AR&R IFD tables is fundamental to good design and it is really unrealistic to add another level of detail to the design when a major factor - rainfall design curves - is outdated. They have funding for the revision currently, but it seems a bit shaky - Engineers Australia had to bargain hard for the money. This funding should be shored udd up, maybe even topped up to make sure we get a good result.

developing Water Savings Action Plans a few years back for Kiama Council, Sydney Water subcontracted "Energetics" to apply a scoring program to assess where Kiama Council sat in terms of its potable water use practices. This involved getting key people from different departments within Kiama Council to sit together and go through a list of questions. Energetics then went away, processed the results and wrote a report on where Kiama Council sat (i.e. one star, two star, through to a five star rated organisation) and what it needed to do to improve. This allowed me to ascertain Kiama Council's

performance relative to other Councils' who had participated in the same program, and present the findings to Kiama Council's Councillors and executive, which helped enormously regarding convincing these people to improve Kiama Council's performance and how. If it hasn't already been done, perhaps the same could be undertaken for Water Sensitive Cities, perhaps using the typology of six city states identified in Brown et al, "Urban Water Management in cities: historical, current and future regimes", Water Science and Technology, 59(5): 847-855, 2009.

How do we convince governments that a water sensitive city is not an ideal, but a necessary development.

How to engender a deeper understanding institutionally and in the population generally that economic 'security' and/or 'certainty' are a subset of ESD, not vice versa. In fact, that the idea of certainty is crazy.

Enough research - get on with it! :-)

How to prevent white elephants such as silted up SQUIDs from occurring.

How do we future proof our infrastructure that will enable adaptability into the future even though we have no idea what we want to do with that stuff now..

Incremental cost of decentralised systems

Research community attitudes (not business or govt) about WSC so that those attitudes can be built upon.

Australian cities are very vast, so how to ensure the transition to a water sensitive city at the largest scale including inner-city.

run out of time

Keep working on the institutional changes needed and how to transition

Can alternate mechanisms be used to achieve WSUD without demolishing existing organisation structures (or are the barriers too large).

What would be the clear roles for different sectors in the transition to WSC. This is important so that we all understand each other's responsibilities for moving forward and accountabilities can be agreed

The practicality of installing third pipe systems

Institutional options to promote WSC and distributed systems in that model. Water quality management and protection in a WSC model.

I would like to know more about managing risk in moving towards a WSC, and how we can better encourage sector-wide learning about WSC.

see above for topics

The degree to which "artificial" underground stormwater capture can be developed (e.g. Atlantis systems or equivalent)

Mapping and engagement of existing NSW stakeholders and initiatives; and in order to develop and deliver and NSW action plan for the transition to water sensitive city. Without addressing State/Territory

needs, development of resources and tools to assist councils will be pointless. Need to address all three levels of government, not just local and irrespective that this is where the majority of urban water management is conducted.

1. What is the cost of transitioning to a Water Sensitive City? How does this compare to the 'business as usual' approach and desalination. 2. What are the hurdles associated with getting the community to adopt a WSC? 3. How can planners, engineers and architects be informed to consider water management in design? 4. How do our water retailers need to change to manage and develop a WSC?

Health and safety issues in relation to recycled water

How do we store stormwater in urban areas to use in the third pipeline

Greater realisation of cost benefit of WSC innovations

The use of technologies such as green roofs

start with the facts and how the education process can be improved to make senior management and councillors change their opinion and understand that it is actually more important than building a road (for example!)

Include KPI

Effectiveness of Water Sensitive Urban design and design elements of City

1. It's not new it's just a different paradigm & needs our current tools to be modified and realigned. 2. What is the economic benefit of the water sensitive city vs status quo.

What Govt structures will best support WSCs

- perception vs reality? - what is the community understanding of water sensitive cities and what do they think of water recycling and reuse - what value is water in the community

site WSUD across a whole catchment - what impact on waterways

How do we pull this all together to start the ball rolling and to create a snowball effect and gain further momentum.

How to change foster champions? We know they're important but how do we get/make them?

how to retrofit existing urban areas

How can we meaningfully involve the community in this process because if they share our aspirations they can be an enabler for political action and commitment

Research into cost effective monitoring of WSUD technologies - to allow successes to be proven and promoted - therefore promoting and encouraging ongoing uptake of WSUD.

Maintenance capacity

Double pipe in existing suburbs and storm water harvesting systems for open spaces

Research for cost effective on site treatment and into the management of the soil moisture profile in the

urban environment.

Taking knowledge from the laboratory to field testing to full scale prototypes and also a commitment to monitoring including key factors to be measured and a common glossary of terms which enable a degree of flexibility without loss of meaning

How can WSC assist in abating the heat island effect? Does WSC have a role in climate change abatement or adaptation? Does WSC benefit ecological biodiversity?

Factors leading to successful demonstration projects that revalue water and are disseminated widely (informing new projects)

How can key institutional barriers be overcome?

how can we develop water sensitive cities without the financial pain... what can done to offset the cost of implementing water sensitive initiatives...if it can be shown that by undertaking changes (landscaping, consolidation, better public amenity & redevelopment) of council land the overall cost could be partially or wholly offset from development opportunities

has technology provided additional natural water resources that have not been considered in the mix of options available

Development of conceptual model by DSE in partnership with key stakeholders being the next engagement tool

getting MUSIC accepted for Swan Coastal Plain Soils

Relationships between a water sensitive city, a climate smart city, a healthy city, a biologically diverse city. Also examining the relationships between existing land use practices, expanding footprint and populations.

financial constraints and how to move ahead (GFC)

What are the cumulative benefits/impacts of a transition to a water sensitive city in terms of economic, environmental and social outcomes?

Internalising externalities in the management of water in Greater Adelaide, e.g. water quality impacts, water allocation issues etc.

finding the supply vs. usage balance that allows a city to be sensitive (including environmental aspects) and what is the population threshold we need to keep below to be sustainable

-Interaction with rural areas. -Interaction with other issues (e.g. energy)

More work to be done on the triple bottom line assessments, particularly environmental aspects.

None I can think of right now

Does Infrastructure Australia understand what a WSC is?

Can WSUD features be economically maintained by councils to ensure that the features continue to their job?

How can the innate affinity for water in all people be used to educate them about water and to make cities and lifestyles more water sensitive? what does it take to make people realise that we depend on water utterly and that it is a part of any element of our environment, 'artificial' or 'natural'? how can we realise and live this reality?

How to effectively harvest and re-use stormwater in the urban environment

Not new, but definitely the science behind champions and change management got me pretty excited, I'd like to see work done on how to make this process more efficient, so much time and $$ is wasted in organisations around poor change management and the lack of follow through with concepts that are not afforded a champion.

I think just generally with the research it needs to be coordinated through a national arrangement, also definitely more work is required on institutional arrangements not just creating a one fit mould but rather providing a tool whereby opportunities can be realised and reform encouraged

Holistic project benefits evaluation

Its not a research question but SEQ has Water by Design as a source of information on how to implement WSUD but I'm not aware of a source for the products which can be incorporated from the household to development level. So the issue is more communication than research.

getting a better understanding of TBL costs to help educate government and developers of the actual costs/ benefits of WSC

How to use the planning system more constructively and effectively.

What is the yield of individual tanks being installed compared to regional roof water collection - whole of subdivision being piped to regional storage.

Long term operational and maintenance requirements, and total life cycle costing for WSUD approaches.

networking and information exchange methods and achieving government/political and enterprise commitment to concept

Why should cities in drought-affected areas, not automatically be on water restrictions.

Scenarios for a new water sector that enable us to transition to WSC - governance arrangements, technical skills, dollars cementing knowledge of IWCM relationships between subcatchments Advancing MUSIC and making other models predictive

None

Questions about the dichotomy between market preferred approaches by government to providing services and the fact that 'markets' are currently not functional or appropriate for many water services particularly in country. Real questions about how govt sees itself in the role of water services (everything from drainage to potable) and what this means for implementation

What will a water sensitive city look like?

economic realities of water reform

How will the community benefit?

research in how to solve the issues, less research on the fact that there IS a problem!!

Local risk of not taking action

Understanding the need for creating a green environment and how that supports the water sensitive environment

Why don't people care about WSCs - "just build another desal plant!"

Key element is that one size want fit all - at macro, meso and micro levels. What framework is required to provide appropriate flexibility to accommodate flexibility towards achievement of common objectives.

How are regional Cities and rural towns transitioning towards water sensitive design/development? What aspects of water sensitive design/development can be learnt from Australia's rural Cities and towns? How have total water bans impacted on a towns/City's uptake of water sensitive design/development?

Heat island effect impacts on health & scarce resources (e.g. power blackouts), effects of greywater use in Perth/cities (long term effects on bores/soil/plants), technical & safety issues arising from undergrounding powerlines in heat island areas